

## Development of *Leucoma salicis* (L.) (Lepidoptera: Lymantriidae) on *Populus alba* (L.) and Poplar Clone "I-214"<sup>1</sup>

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### ABSTRACT

Tests were made to determine if the phytophagous insect *Leucoma salicis* (L.) (Lepidoptera: Lymantriidae), preferred *Populus alba* (L.) or Poplar Clone "I-214" as its host. These tests were based on field observations in experimental plots at the nursery of the Forest Research Institute in Thessaloniki, N. Greece. The observations which continued for a two-year period (1984, 1985) corroborated the high resistance of *P. alba* to *L. salicis*. Rearing on this host-plant caused retarded growth, produced lower number of eggs, caused higher larval mortality and generally showed reduced development always, in comparison with the rearing of this insect on leaves of Clone "I-214".

### Introduction

*Leucoma* (= *Stilpnotia*) *salicis* (L.) is one of the most harmful leaf-eating insects in Europe extending from the Scandinavian countries to the Mediterranean region (Schwenke 1978). It can also be found in North Africa and in Asia Minor. In China it is also considered a serious pest that attacks poplar plantations (Wei 1988). In Greece this insect has two generations per year, and damages mainly poplars and infrequently willows (Kailidis 1986). In this research, food demands of *L. salicis* were examined in order to ascertain if the severity of infestation could be reduced by the application of appropriate silvicultural measure, for example selection of the right poplar host plant for planting at a particular site.

### Materials and Methods

The experiments lasted for two years (1984, 1985), and two and three-year old poplar trees of the European Clone "I-214" and also *P. alba* were

used. The experimental plots were located in a nursery which belongs to the Forest Research Institute of Thessaloniki (N. Greece).

On the trees which were selected for the necessities of the experiments, young larvae of *L. salicis*, 24 hours old, were placed. Annually, 12 groups which contained 50 larvae each were enclosed in cloth bags on 6 trees of "I-214" and on 6 trees of *P. alba*, with enough food for their development. In this way the action of natural enemies was excluded.

The first placement occurred on July 4, 1984 and the same process was repeated in 1985 (July 20). By daily observation the start of pupation was assessed. Every day the pupae which were formed were removed from the cloth bags and were stored in glass tubes at room temperature. The development of *L. salicis* in relation to food consumption was estimated by the following biological measures: larval weight 20 and 30 days after the beginning of the experiment, larval mortality, duration of the larval stage, weight of the pupae, fecundity (number of eggs per female). Means were compared at the 0.05 level using the t-test (Steel and Torrie 1980). Further details are given in the results section.

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TABLE 1. Influence of host plant on the development and fecundity of *L. salicis* during 1984 and 1985 (Mean  $\pm$  SD).

	1984		1985	
	I-214	<i>P. alba</i>	I-214	<i>P. alba</i>
Larval weight 20 days after the beginning of the experiment (gr)	0.06 $\pm$ 0.02 a	0.006 $\pm$ 0.008 b	0.06 $\pm$ 0.001 a	0.007 $\pm$ 0.00001 b
Larval weight 30 days after the beginning of the experiment (gr)	0.42 $\pm$ 0.15 a	0.02 $\pm$ 0.03 b	0.2 $\pm$ 0.12 a	0.01 $\pm$ 0.005 b
Larval mortality (%)	30.0	80.6	41.2	96.0
Duration of the larval stage in days	33.9 $\pm$ 1.9 a	57.6 $\pm$ 8.9 b	37.2 $\pm$ 2.6 a	60.3 $\pm$ 6.1 b
Duration of the larval plus pupal stages in days	40.7 $\pm$ 1.6 a	63.9 $\pm$ 7.1 b	42.6 $\pm$ 2.4 a	65.1 $\pm$ 6.0 b
Weight of pupae (gr)	0.49 $\pm$ 0.14 a	0.19 $\pm$ 0.07 b	0.43 $\pm$ 0.12 a	0.16 $\pm$ 0.02 b
Fecundity-number of eggs per female (n)	354.0 $\pm$ 70.9 a	92.0 $\pm$ 37.5 b	352.0 $\pm$ 73.2 a	64.0 $\pm$ 25.9 b

\* In each year, means followed by different letters in the row are significantly different at 0.05 level.

### Results

For two consecutive years *L. salicis* showed significantly better development on Clone "I-214" than on *P. alba*. The leaves of *P. alba* seem to be an unsuitable diet for *L. salicis* (Table 1). The weight of larvae which fed on *P. alba* was lower than the weight of those fed on Clone "I-214". This influence was evident on the weight 20 and 30 days after the beginning of the experiment in both years 1984 and 1985. A similar influence was also seen in the case of larval mortality. Larvae reared on *P. alba* suffered higher rates of mortality than those fed on Clone "I-214". Their rate of development was also affected by the kind of food. A shorter duration of the larval stage was recorded on Clone "I-214" than on *P. alba*.

Larval diet also affected the length of the larval plus pupal stages. In the repeats of 1984 and 1985 it was found that the larval and pupal stages were faster on Clone "I-214" than on *P. alba*. The weight of the pupae also seemed affected by the host plant. Larvae reared on *P. alba* leaves gave pupae with the lowest weight. The type of host plant influenced insect fecundity also. Females fed as larvae on Clone "I-214" produced the highest number of eggs, while those moths fed in the larval stage on *P. alba* were found to produce the lowest number of eggs.

### Discussion

*P. alba* is a less suitable host than Poplar Clone

"I-214" for *L. salicis*. It is not clear whether this is a non-acceptance or an antibiosis type of resistance. The effect of chemism (Avtzis 1978, Bombosch 1972, Lunderstädt et al. 1975, Nef 1982, 1985, Schopf et al. 1982, Schopf 1983, Schopf and Avtzis 1987) as well as of the structure of food taken by the herbivorous insects (Führer 1967, Huang 1975, Huang and Führer 1979) influences their development. This field of observation corroborated the high resistance of *P. alba* in comparison to Clone "I-214" to *L. salicis*. Nef (unpublished work) found that feeding on *P. alba* resulted in increased larval mortality and inferior pupal weight.

Although heavy defoliation from *L. salicis* was shown to cause growth reduction in poplar plantations, it is not profitable from an economic standpoint to use *P. alba* for establishing poplar plantations, which in Greece consist of 70% of Clone "I-214". Planting of *P. alba* in parks and roadsides might reduce the problem of damage by *L. salicis* in some areas.

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KEY WORDS: *Leucoma* (= *Stilpnotia*) *salicis*, *Populus alba*, Poplar Clone "I-214"

## Ανάπτυξη του Φυλλοφάγου Εντόμου *Leucoma salicis* (L.) (Lepidoptera: Lymantriidae) σε *Populus alba* (L.) και τον Κλώνο "I-214"

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### ΠΕΡΙΛΗΨΗ

Σε πειραματικές επιφάνειες του Ιδρύματος Δασικών Ερευνών της Θεσσαλονίκης πραγματοποιήθηκαν το 1984 και 1985 πειράματα υπαίθρου με σκοπό τη διερεύνηση της επίδρασης της λευκής *Populus alba* (L.) και του κλώνου "I-214", σαν υλικό εκτροφής, πάνω στην εξέλιξη του λεπιδόπτερου *Leucoma salicis* (L.). Η επίδραση του φυτού-ξενιστή πάνω στο συγκεκριμένο έντομο πιστοποιήθηκε με τη βοήθεια των παρακάτω βιολογικών παραμέτρων: βάρος προνύμφης 20 και 30 ημέρες μετά την έναρξη των πειραμάτων, θνησιμότητα προνύμφης, διάρκεια προνυμφικού σταδίου, συνολική διάρκεια προνυμφικού και νυμφικού σταδίου, βάρος της νύμφης, αριθμός αυγών ανά θηλυκό. Τα διάρκειες δύο χρόνων πειράματα έδειξαν μια υψηλή ανθεκτικότητα του δασοπονικού είδους *P. alba* απέναντι στο φυλλοφάγο *L. salicis*. Σε κάθε περίπτωση, η εκτροφή του εντόμου πάνω στο *P. alba* είχε σαν αποτέλεσμα τη χειρότερη ανάπτυξη του σε σχέση πάντοτε προς την εκτροφή του εντόμου πάνω σε "I-214".